scenery, mammals, and birds of the South Polar zone. The author commented on the urgent need of international measures to preserve the fauna of these regions.

Mathematical Society, February 13.—Mr. J. E. Campbell, president, in the chair.—Prof. H. S. **Carslaw**: Diffraction of waves by a wedge of any angle.—T. C. **Lewis**: General or non-orthogonal pentaspherical co-ordinates.

Manchester.

Literary and Philosophical Society, February 4.—Mr. W. Thomson, president, in the chair.—R. S. **Adamson** and A. McK. **Crabtree**: The herbarium of John Dalton. The paper consisted of a short account of the history of the collection and of Dalton's botanical work. Some of the more important points of botanical interest in the collection were dealt with.

Paris.

Academy of Sciences, February 3.—M. Léon Guignard in the chair.—M. Pierre Viala was elected a member of the section of rural economy in succession to the late A. Muntz.—A. **Angelesco**: Two extensions of algebraic continued fractions.—E. **Maillet**: The gradually varied movement and the propagation of bores.—L. **Décombe**: Sadi Carnot and the principle of equivalence of heat and work; his calculation of the mechanical equivalent of heat reconstituted with the aid of data taken exclusively from the "Réflexions sur la puissance motrice du feu." Following Clausius, the reproach has frequently been made against Carnot that he adopted the material theory of heat, but it should not be forgotten that this was done with serious reserves, and this is shown by passages from his memoir. In the manuscript notes of Sadi Carnot, quoted in full, is a series of objections to the material theory of heat, followed by a formal enunciation of the principle of equivalence, in the following terms:—"From some ideas which I have formed on the theory of heat, the production of one unit of motive power necessitates the destruction of 2·70 units of heat." This figure of Carnot leads to 370 kg. for the mechanical equivalent, as against the 365 kg. given at least ten years later by Mayer. Carnot also sketched out a programme of experiments practically identical with those carried out fifteen or twenty years later by Joule, Colding, and Hirn.—MM. **Gutton** and **Touly**: Non-deadened electric oscillations of short wave-length. The apparatus, which is described in detail and with a diagram, furnishes waves of less than two metres in length, and the harmonic vibrations are extremely small.—G. **Claude**: A new application of viscosity. An account of the use of a very viscous liquid in connection with the recoil of artillery. A diagram shows the increased accuracy of shooting obtained by this method of control when compared with the gun in current use.—P. **Gaubert**: Liquid crystals of agaricic acid.—P.-W. **Stuart-Menteath**: The tectonic of the Pyrenees.—A. **Nodon**: Researches on a new method of meteorological prediction. The method is based on the connection between the visible disturbances of the solar surface, electrical and magnetic disturbances on the earth, and those of the atmosphere.—M. **Mirande**: The chondriome, the chloroplasts, and the nucleolar corpuscles of the protoplasm of Chara.—M. **Marage**: The timbre of the voice in the partially deaf.

Washington, D.C.

National Academy of Sciences, November, 1918 (Proceedings, vol. iv., No. 11).—L. B. **Arey** and W. J. **Crozier**: The "homing habits" of the pulmonate mollusc Onchidium. *O. floridanum* lives during high tide in "nests," *i.e.* rock cavities, containing a number of individuals. The individuals leave the nest in low water to feed, and return simultaneously to it before the tide rises again, giving evidence of homing behaviour.—W. J. **Crozier**: (1) Growth and duration of life of *Chiton tuberculatus*. The growth-curve is obtained on the assumption that the age of a Chiton may be estimated from the growth-lines upon its shell. The mean duration of life is probably a little less than eight years. (2) Growth of *Chiton tuberculatus* in different environments. Growth-curves obtained under different conditions are compared.—C. **Barus**: The interferometry of vibrating systems. The high luminosity of the achromatic interferences and the occurrence of but two sharp fringes make it possible to utilise them even in cases when the auxiliary mirrors vibrate. The vibration interferometer is quite sensitive, provided the average currents are of the order of several micro-amperes.—Sir Joseph **Larmor**: The essence of physical relativity. A general discussion of the physics underlying relativity, with particular reference to an article by Leigh Page.—C. **Barus**: Gravitational attraction in connection with the rectangular interferometer. The rectangular interferometer is so sensitive in the measurement of small angles that it may be used for the measurement of the Newtonian constant of gravitational attraction.—W. P. **White**: The general character of specific heats at high temperatures. The general law covering the behaviour of atomic heats from the lowest temperatures up demands that at sufficiently high temperatures all atomic heats at constant volumes should have the value 5·96. A contrary hypothesis has been made, namely, that atomic heats continue to increase with the temperature. The substances here examined give evidence that the atomic heats do increase above the value 5·96.—G. M. **Green**: Certain projective generalisations of metric theorems, and the curves of Darboux and Segre. The continuation of earlier work by the same author in the Proceedings.—C. **Barus**: The rectangular interferometer with achromatic displacement fringes in connection with the horizontal pendulum.

BOOKS RECEIVED.

Astrographic Catalogue, 1900·0, Hyderabad Section. December −16° to −21°. From photographs taken and measured at the Nizamiah Observatory, Hyderabad, under the direction of R. J. Pocock. Vol. ii. Measures of Rectangular Co-ordinates and Diameters of 61,378 Star-images on Plates with Centres in December −18°. Pp. xlix+218. (Deccan, India: Nizamiah Observatory, 1918.) 16*s.* net.

Annuaire Astronomique et Météorologique pour 1919. Par Camille Flammarion. 55^e année. Pp. 364. (Paris: Librairie Ernest Flammarion, 1919.) 3·50 francs.

Meddelanden Från Statens Skogsförsöksanstalt. Häfte 15. Pp. 288+xxxii. (Stockholm: Aktiebolaget Nordiska Bokhandeln, 1918.) 4.50 kronor.

Essays and Discourses. By Sir P. Chandra Rây. With a biographical sketch and a portrait. Pp. xxxii+349. (Madras: G. A. Nathesan and Co., 1918.) 3 rupees.

Organic Thio-compounds, with Special Reference to Tautomeric Changes and the Formation of Polysulphonium Derivatives. Part i. By Sir P. Chandra Rây. Pp. iii+70. (Calcutta: The University, 1919.)

Traitement des Psychonévroses de Guerre. Par G. Roussy, J. Boisseau, and M. d'Oelsnitz. Pp. 191. (Paris: Masson et Cie, 1918.) 4 francs.

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Mirrors, Prisms, and Lenses: A Text-book of Geometrical Optics. By Prof. J. P. C. Southall. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1918.) 3.25 dollars.

Recent Advances in Physical and Inorganic Chemistry. By Dr. A. W. Stewart. With an introduction by Sir William Ramsay. Third edition. Pp. xv+284. (London: Longmans, Green, and Co., 1919.) 12*s.* 6*d.* net.

Recent Discoveries in Inorganic Chemistry. By J. Hart-Smith. Pp. x+91. (Cambridge: At the University Press, 1919.) 4*s.* 6*d.* net.

The Great War Brings it Home. The Natural Reconstruction of an Unnatural Existence. By John Hargrave ("White Fox"). Pp. xvi+367. (London: Constable and Co., Ltd., 1919.) 10*s.* 6*d.* net.

The Voice Beautiful in Speech and Song: A Consideration of the Capabilities of the Vocal Cords and their Work in the Art of Tone Production. By Ernest G. White. New and enlarged edition of "Science and Singing." Pp. viii+130. (London: J. M. Dent and Sons, Ltd., 1918.) 5*s.* net.

The Cultivation of Osiers and Willows. By W. P. Ellmore. Edited, with introduction, by Thomas Okey. Pp. x+96. (London: J. M. Dent and Sons, Ltd., 1919.) 4*s.*

The Theory of Modern Optical Instruments. A Reference Book for Physicists, Manufacturers of Optical Instruments, and for Officers in the Army and Navy. Translated from the German by Dr. A. Gleichen, H. H. Emsley, and W. Swaine. With an Appendix on Rangefinders. Pp. xii+376. (London: H.M.S.O., 1918.)

Mikrographie des Holzes der auf Java Vorkommenden Baumarten, im Auftrage des Kolonial-Ministeriums. Unter leitung von Prof. J. W. Moll. Bearbeitet von Dr. H. H. Janssonius. Fünfte Lieferung. Pp. 337-764. (Leiden: E. J. Brill, 1918.)

DIARY OF SOCIETIES.

THURSDAY, February 20.

Royal Institution, at 3.—Prof. H. M. Lefroy: Insect Enemies of our Food Supplies.

Royal Society, at 4.30.—Jean Dufrenoy: Note on the Metabolism of the Glucosides of the Arbutin Group.—S. S. Zilva and E. M. Wells: Dental Changes in the Teeth of the Guinea-pig produced by a Scorbutic Diet.—W. E. Bullock and W. Cramer: A New Factor in the Mechanism of Bacterial Infection.—Major W. J. Tulloch: The Distribution of the Serological Types of *B. tetani* in Wounds of Men who received Prophylactic Inoculation, and a Study of the Mechanism of Infection in, and Immunity from, Tetanus.

Institution of Mining and Metallurgy, at 5.—S. J. Truscott: Slime Treatment on Cornish Frames: Supplements.—Edwin Edser: The Comparison of Concentration Results, with Special Reference to the Cornish Method of Concentrating Cassiterite.—C. W. Gudgeon: The Giblin Tin Lode of Tasmania.—G. F. J. Preumont: Wolfram Mining in Bolivia.

Linnean Society, at 5.—C. E. Salmon: Drawings of British Orchids and Sea Anemones, by Mr. T. A. Stephenson.—R. H. Burne: Specimens of Sound-producing Organs in Invertebrates and Fishes.

Institution of Electrical Engineers, at 6.—G. L. Addenbrooke: Dielectrics in Electric Fields.

Chemical Society, at 8.—R. G. Fargher and F. L. Pyman: Nitro-, Arylazo-, and Amino-glyoxalines.—J. Knox and M. B. Richards: The Basic Properties of Oxygen in Organic Acids and Phenols; and the Tetravalency of Oxygen.—W. N. Rae: Note on the Action of Chlorine on Tetramethyl Ammonium Iodide.

FRIDAY, February 21.

Geological Society, at 3.—Annual General Meeting.

Royal Institution, at 5.30.—A. T. Hare: Clock Escapements.

Institution of Mechanical Engineers, at 6.—Annual General Meeting. —*Resumed Discussions:* T. T. Heaton: Electric Welding.—H. Cave: The Development of the Oxy-acetylene Welding and Cutting Industry in the United States.—J. H. Davies: Oxy-acetylene Welding.—F. Hazledine: Oxy-acetylene Welding.

SATURDAY, February 22.

Royal Institution, at 3.—Hon. J. W. Fortescue: The Empire's Share in England's Wars—Western Europe.

MONDAY, February 24.

Royal Society of Arts, at 4.30.—Prof. J. A. Fleming: Scientific Problems of Electric Wave Telegraphy.

Royal Geographical Society, at 8.—Lt.-Col. H. S. L. Winterbotham: Geography with the British Armies in France.

TUESDAY, February 25.

Royal Institution, at 3.—Capt. G. P. Thomson: The Dynamics of Flying.

Royal Society of Arts, at 4.30.—E. J. Duveen: Key Industries and Imperial Resources.

Institution of Civil Engineers, at 5.30.—F. J. Mallett: The Flow of Water in Pipes and Pressure Tunnels.—A. A. Barnes: Discharge of Large Cast-iron Pipe-lines in Relation to their Age.

Illuminating Engineering Society, at 8.—A. Cunnington: Some Notes on Railway Lighting and its Maintenance.

WEDNESDAY, February 26.

Royal Society of Arts, at 4.30.—W. L. Hichens: The Wage Problem in Industry.

Geological Society, at 5.30.—Lieut. E. H. Pascoe: The Early History of the Indus, Brahmaputra, and Ganges.

Royal Aeronautical Society, at 8.—Capt. F. S. Barnwell: Some Points on Aeroplane Design.

THURSDAY, February 27.

Royal Institution, at 3.—Prof. H. M. Lefroy: How Silk is Grown and Made.

Royal Society, at 4.30.—*Probable Papers:* Hon. R. J. Strutt: Scattering of Light by Solid Substances.—Sir James Dobbie and Dr. J. J. Fox: The Constitution of Sulphur Vapour.—Dr. W. G. Duffield, T. H. Burnham, and A. H. Davis: The Pressure upon the Poles of the Electric Arc.

Child-Study Society, at 6.—Dr. P. B. Ballard: The Claim of the Individual Child.

Institution of Electrical Engineers, at 6.—Dr. S. F. Barclay and Dr. S. P. Smith: The Determination of the Efficiency of the Turbo-alternator.

FRIDAY, February 28.

Physical Society, at 5.—Philip R. Coursey: Simplified Inductance Calculations, with Special Reference to Thick Coils.—Dr. Ralph Dunstan: Demonstration of Some Acoustic Experiments in Connection with Whistles and Flutes.—G. A. Brodsky: Demonstration of a New Polariser.

Royal Institution, at 5.30.—Sir Oliver Lodge: Ether and Matter.

SATURDAY, March 1.

Royal Institution, at 3.—Hon. J. W. Fortescue: The Empire's Share in England's Wars—Eastern Europe.

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